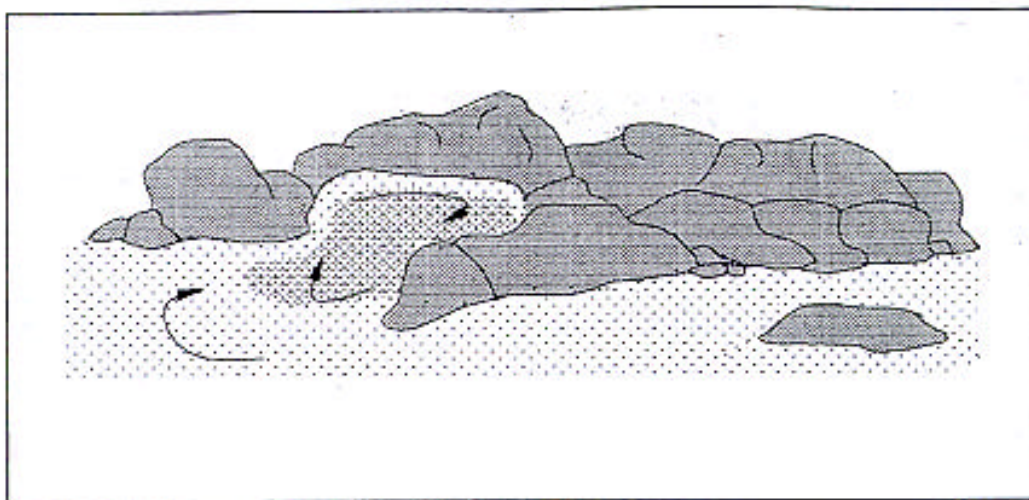
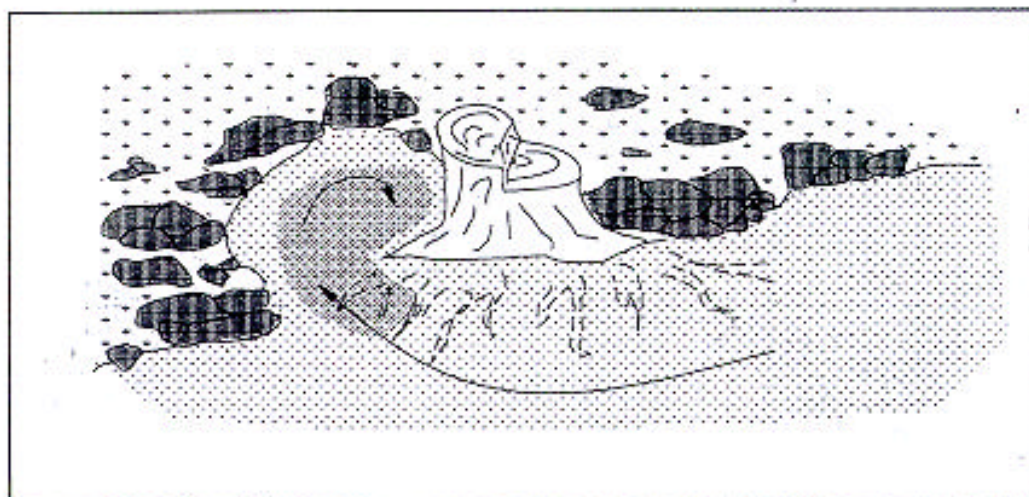

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BACKWATER POOL - BOULDER FORMED (BPB) [6.2] {5}



Found along channel margins and caused by eddies around a boulder obstruction. These pools are usually shallow and are dominated by fine-grain substrate. Current velocities are quite low.

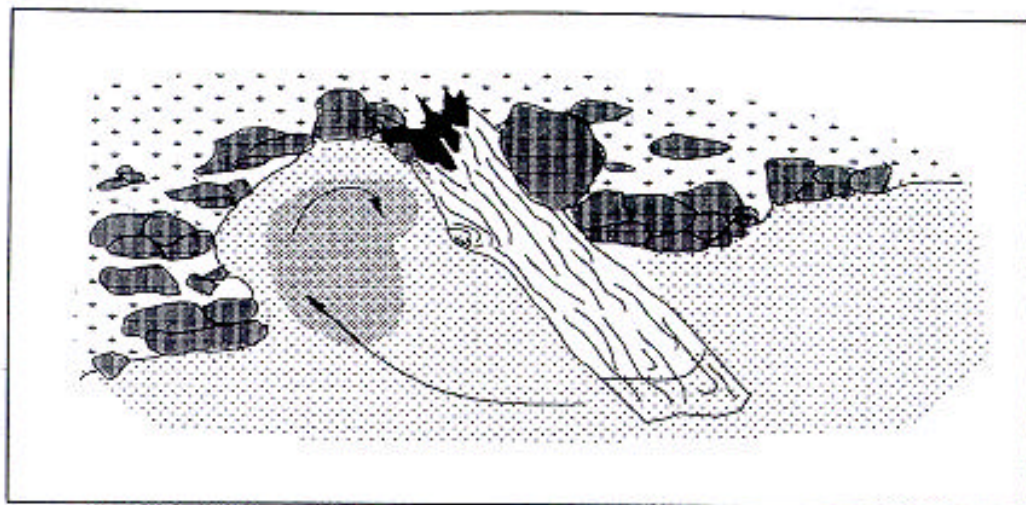
BACKWATER POOL - ROOT WAD FORMED (BPR) [6.3] {6}



Found along channel margins and caused by eddies around a root wad obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

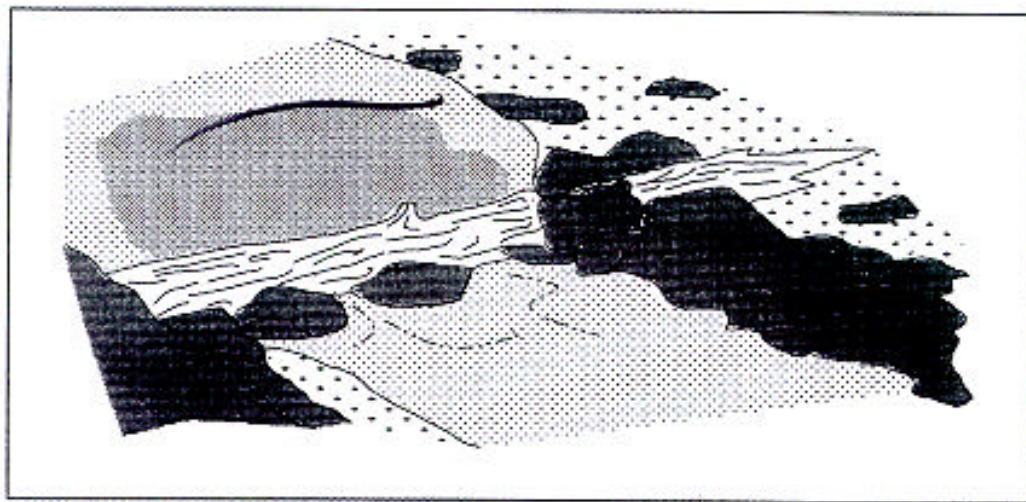
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BACKWATER POOL - LOG FORMED (BPL) [6.4] {7}



Found along channel margins and caused by eddies around a large woody debris obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

DAMMED POOLS (DPL) [6.5] {13}



Water impounded from a complete or nearly complete channel blockage (log debris jams, rock landslides or beaver dams). Substrate tends to be dominated by smaller gravel and sand.

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Instream Shelter

Instream shelter within each habitat unit can be rated according to a standard system. This rating system is a field procedure for habitat inventories which utilizes objective field measurements. It is intended to rate, for each habitat unit, complexity of shelter that serves as instream habitat or that creates areas of diverse velocities which are focal points for salmonids. In this rating system, instream shelter is composed of those elements within a stream channel that provide protection from predation for salmonids, areas of reduced water velocities in which fish can rest and conserve energy, and separation between territorial units to reduce density related competition. This rating does not consider factors related to changes in discharge, such as water depth.

Instream Shelter Complexity. A value rating can be assigned to instream shelter complexity. This rating is a relative measure of the quantity and composition of the instream shelter.

Value	Instream Shelter Complexity Value Examples:
0	<ul style="list-style-type: none">• No shelter.
1	<ul style="list-style-type: none">• One to five boulders.• Bare undercut bank or bedrock ledge.• Single piece of large wood (>12" diameter and 6' long) defined as large woody debris (LWD).
2	<ul style="list-style-type: none">• One or two pieces of LWD associated with any amount of small wood (<12" diameter) defined as small woody debris (SWD).• Six or more boulders per 50 feet.• Stable undercut bank with root mass, and less than 12" undercut.• A single root wad lacking complexity.• Branches in or near the water.• Limited submersed vegetative fish cover.• Bubble curtain.
3	<p>Combinations of (must have at least two cover types):</p> <ul style="list-style-type: none">• LWD/boulders/root wads.• Three or more pieces of LWD combined with SWD.• Three or more boulders combined with LWD/SWD.• Bubble curtain combined with LWD or boulders.• Stable undercut bank with greater than 12" undercut, associated with root mass or LWD.• Extensive submersed vegetative fish cover.

Instream Shelter Percent Covered. Instream shelter percent covered is a measure of the area of a habitat unit occupied by instream shelter. The area is estimated from an overhead view.

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Instructions for Completing the Habitat Inventory Data Form

- 1) **Form No.** - Print in the form number. Number the forms sequentially beginning with "01" on the first page and "02" on the second and so on.
- 2) **Date** - Enter the day's date: mm/dd/yy.
- 3) **Stream Name** - Print in the stream name.
- 4) **Legal** - Enter the township, range and section of the stream confluence or from where you started the survey from the USGS quadrangle.
- 5) **Surveyors** - Enter the names of the surveyors.
- 6) **Lat** - Enter the latitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (Part II- Instructions for Completing Watershed Overview Work Sheet).
- 7) **Long** - Enter the longitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (Part II- Instructions for Completing Watershed Overview Work Sheet).
- 8) **Quad** - Enter the name of the 7.5-minute USGS quadrangle on which the confluence of the stream appears.
- 9) **Channel Type** - Record the channel type determined from completing the Stream Channel Type Work Sheet (Part III). Record in the comments the habitat unit number in which the channel type change occurs in.
- 10) **Reach** - Enter the reach number beginning with 1 for the lowermost channel type in the basin. Each stream channel type change proceeding upstream will be designated by a new stream reach number.
- 11) **Flow Measurement** - Record the flow at the beginning and the end of the survey, at the same location. Record in cubic feet/second.
- 12) **Time** - At the beginning of each page enter the time in military time (24-hour clock).
- 13) **Water Temperature** - At the beginning of each page record the water temperature to the nearest degree Fahrenheit. Water temperatures are taken in the middle of the habitat unit, within one foot of the water surface.
- 14) **Air Temperature** - At the beginning of each page record the air temperature to the nearest degree Fahrenheit. Air temperatures are taken in the middle of the habitat unit.
- 15) **Page Length** - Sum of the mean length for the page.
- 16) **Total Length** - Sum of all the page lengths through the current page.

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- 17) **Habitat Unit Number** - Enter the habitat unit number. Record these numbers in sequential order, beginning with "001" at the survey start. When numbering side channels begin with the number of the unit where the split or divide begins; use a new column and entirely fill it out for each subsequent side channel unit, and number the units sequentially adding a ".1", ".2", etc. as appropriate to describe the exact position of the side channel units. Example of a side channel with two habitat units:

Habitat Unit Number	005	006	006.1	006.2	007
Habitat Unit Type	5.3	1.1			4.2
Side Channel Type			1.1	3.2	

- 18) **Habitat Unit Type** - Determine the type of habitat unit and enter the appropriate habitat type number code. If the unit is dry, use 7.0 for the habitat unit type. If a stream length is contained within a culvert, use 8.0 for the habitat unit type. If the length of stream was not surveyed due to lack of access, use 9.0 for the habitat type. If the length of stream was not surveyed due to a marsh, use 9.1 for the habitat unit type. Record all pertinent information in the comments.
- 19) **Side Channel Type** - Determine the type of habitat unit and enter the appropriate habitat type number code.
- 20) **Mean Length** - Enter the thalweg length of the habitat unit, in feet.
- 21) **Mean Width** - Measure two or more wetted channel widths within the habitat unit. Calculate and enter the mean width for the habitat unit, in feet.
- 22) **Mean Depth** - Take several random depth measurements across the unit with a stadia rod. Calculate and enter the mean depth, in feet.
- 23) **Maximum Depth** - Enter the measured maximum depth for each habitat unit, in feet.
- 24) **Depth Pool Tail Crest** - Measure the maximum thalweg depth at the pool tail crest, in feet. This measurement is taken only in pool habitat units and is used to determine the pool's residual volume.

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- 25) **Pool Tail Embeddedness** - Percent cobble embeddedness is determined at pool tail-outs where spawning is likely to occur. Sample at least five small cobbles (2.5" to 5.0") in diameter and estimate the amount of the stone buried in the sediment. This is done by removing the cobble from the streambed and observing the line between the "shiny" buried portion and the duller exposed portion. Estimate the percent of the lower shiny portion using the corresponding number for the 25% ranges. Average the samples for a mean cobble embeddedness rating. Additionally, a value of 5 is assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations:
- 1 = 0 to 25%
 - 2 = 26 to 50%
 - 3 = 51 to 75%
 - 4 = 76 to 100%
 - 5 = unsuitable for spawning
- 26) **Pool Tail Substrate** - Enter the letter code (A through G) for the dominant substrate composition of the tail-out for all pools.
- 27) **Shelter Value** - Enter the number code (0 to 3) that corresponds to the dominant structural shelter type that exists in the unit (Part III- Instream Shelter Complexity).
- 28) **Percent Unit Covered** - Enter the percentage of the unit occupied by the structural shelter. Classify 100 percent of the shelter by the types indicated on the form. Note: bubble curtain includes white water.
- 29) **Substrate Composition** - Enter a "1" for the dominant substrate and a "2" for the co-dominant substrate. Note: changes in the dominant and co-dominant substrate may indicate that the channel type has changed.
- 30) **Percent Exposed Substrate** - Enter the estimated percentage of the bottom substrate of the unit that is exposed above the water surface.
- 31) **Percent Total Canopy** - Enter the percentage of the stream area that is influenced by the tree canopy. The canopy is measured using a spherical densiometer at the center of each habitat unit (Appendix M).
- 32) **Percent Broadleaf Trees** - Estimate the percent of the total canopy consisting of broadleaf trees.
- 33) **Percent Evergreen Trees** - Estimate the percent of the total canopy consisting of evergreen trees.
- 34) **Right Bank Composition** - Observed at the bankfull discharge level. Enter the number (1 through 4) for the right bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The right bank is the right side of the stream when facing downstream.

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- 35) **Right Bank Dominant Vegetation** - Enter the number (5 through 9) for the right bank dominant vegetation type, from bankfull to 20 feet upslope, corresponding to the list located on the lower left hand side of the form. Enter one number only.
- 36) **Percent Right Bank Vegetated** - Estimate the total percentage of the right bank covered with vegetation from bankfull discharge level to 20 feet upslope.
- 37) **Left Bank Composition** - Observed at the bankfull discharge level. Enter the number (1 through 4) for the left bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The left bank is the left side of the stream when facing downstream.
- 38) **Left Bank Dominant Vegetation** - Enter the number (5 through 9) for the left bank dominant composition type, from bankfull to 20 feet upslope, corresponding to the list located on the lower left hand side of the form. Enter one number only.
- 39) **Percent Left Bank Vegetated** - Estimate the total percentage of the left bank covered with vegetation from bankfull discharge level to 20 feet upslope.
- 40) **Comments** - Add comments which are important to that habitat unit such as: 1) the location of tributaries and the water temperature within that tributary, bridges, culverts or diversions; 2) the presence of landslides or barriers; or 3) a change in channel type, etc.

